Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Two temperature scales in the d-wave pair correlation length of the 2D t-J model WILLIAM PUTIKKA, Physics Department, Ohio State University — Two temperature scales are observed in the d-wave pair correlation length for doping $\delta \sim 0.25$. Both the s-wave and d-wave pair correlation lengths increase with decreasing temperature starting at very high temperatures. By $T \sim 3J$ both symmetries have grown to $\sim 1/3$ of a lattice spacing. For $T > 3J$ the s-wave correlation length is a few percent larger than d-wave. At $T \sim 3J$ both symmetries are saturating, with the growth in the correlation length flattening for both symmetries. The s-wave correlation length does not grow at lower temperatures. The d-wave correlation length does resume growing at $T \sim 0.8J$, with the growth at low temperatures much stronger than it was at high temperatures. The d-wave correlation length reaches a size of one lattice spacing at $T \sim 0.25J$ with no sign of saturating. Interestingly, both of these temperature scales also occur in the t-J model momentum distribution $n_{\mathbf{k}}$. The features that are found in the temperature dependence of the 2D $n_{\mathbf{k}}$ on the zone diagonal are very similar to the temperature dependence of the 1D t-J model $n_{\mathbf{k}}$. These observations can be understood by having spin-charge separated degrees of freedom.

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Date submitted: 11 Nov 2011 Electronic form version 1.4